The AMERICAN ENGINEER

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IN THIS ISSUE:

COURT RULES ON VALIDITY OF CONSTRUCTION CONTRACTS

ENGINEERING—SCIENCE, INDUSTRY, OR LABOR

NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS
FOUNDED 1934

DECEMBER, 1946

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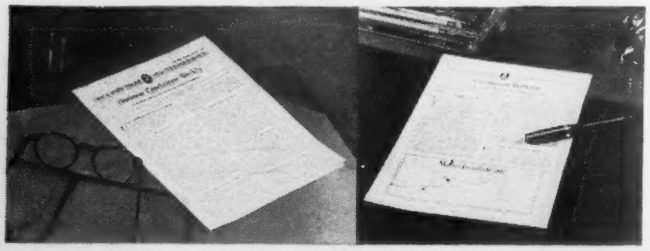

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In This Issue —

	Page
NSPE Board of Directors Luncheon, St. Louis, Photograph	2
Story of NSPE Board Meeting, St. Louis, October 27-28	3
President Ritchie Lawrie, Jr., Address at NCSBEE, St. Louis	4
Employers, Employees, and NSPE, by T. S. Thompson	6
Court Rules on Validity of Construction Contracts	8
Brain Twisters, a New Feature by Engineer Stephen A. Derry	8
"Builders of The Bridge," A Review of Dr. D. B. Steinman's Book	9
Engineering—Science, Industry, or Labor, by H. A. Meyerhoff	11
Sketch Showing Arrangement of Washington Headquarters Office	13
Officers and Directors, Member State Societies	14
National and State Society News	15
News From the Washington Office by Executive Director Paul H. Robbins	15
Coming Events to Remember	15
What's New	23

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NSPE Board of Directors' Luncheon, St. Louis, Mo., October 27th, 1946

Seated on the Head Table at the Top of this Picture, Reading Left to Right: Col. Walter L. Simpson, Past President; Lacey Coad, Manager of the Washington Office; Paul H. Robbins, Executive Director; S. L. Stolte, National Director from Minnesota; J. F. Fairman, Vice-President, Northeastern Area; NSPE President Ritchie Lawrie, Jr.; M. Barry Watson, Secretary, Dominion Council of Professional Engineers in Canada; Alex Van Praag, Jr., Vice-President, Central Area; Samuel I. Sacks, General Counsel.

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NSPE Board Meeting October 27-28 At Hotel Statler In St. Louis

NSPE-NCSBEE Boards Meet In Joint Session

The representatives of the NSPE and the National Council of State Boards of Engineering Examiners met simultaneously at the Hotel Statler in St. Louis on October 27-28. It was a regular meeting of the NSPE Board and the annual meeting of the NCSBEE. Although the sessions were concerned with the individual problems of each organization a joint meeting of the two Boards met to discuss mutual problems on the afternoon of October 27.

The recommendations of the joint committees of these two organizations were reviewed in detail by Mr. J. F. Fairman, Vice-President of the NSPE and Chairman of the joint committee. The two joint boards considered ways of implementing the recommendations of this committee and took definite steps to accomplish the coordinated program of the two societies.

The joint committee had previously recommended to the two societies that a small pamphlet outlining the advantages of registration and the need for professionalism among engineers be prepared by the two societies and distributed to senior engineering students in our colleges and universities. Dean Daugherty of the University of Tennessee, who is preparing this pamphlet, reported that several drafts had been made and that it appeared that there was a need for a brief summary of the subject together with a more extensive development of registration and professionalism. The joint boards approved a four page pamphlet and recommended that Dean Daugherty continue his preparation for early printing and distribution, the larger development to be forthcoming at some later date.

In the absence of Professor Nold, past President of NSPE and chairman of its committee on Practices and Ethics, Mr. Bruce Williams, a member of this committee, presented Professor Nold's report. This report recommended the endorsement of the Canons of Ethics prepared by the Engineering Committee for professional development, and which had been adopted previously that day by the Board of Directors of NSPE. The suggestion was made to the NCSBEE for a similar endorsement.

Professor Knipmeyer, a member of both the ECPD committee on Code of Ethics and the NCSBEE — NSPE joint committee, reported that the Canon of Ethics had the approval of ECPD, but the shorter code recommended by NSCBEE had not been favorably accepted by ECPD.

President H. T. Person of NCSBEE presided at the joint meeting, and the President of NSPE extended a few words of greeting to the group.

On the evening of October 28 the NCSBEE held its annual banquet at which many members of the Board of NSPE were in attendance.

The principal speakers at this banquet were Mr. W. W. Horner, President of ASCE, and Mr. Ritchie Lawrie, Jr., President of NSPE. Mr. Horner gave a very interesting talk outlining the direction in which the engineering profession is moving, as he saw it, and the relationships to this movement of the American Society of Civil Engineers.

President Lawrie continued in the same theme outlining the necessity for engineers to coordinate their own efforts in bettering the profession. Mr. Lawrie's talk appears elsewhere in this issue of the American Engineer.

NSPE Board Passes $7 Dues For 1947

An extensive agenda covering a number of items of interest to the engineering profession was discussed and acted upon at a regular meeting of the Board of Directors of the NSPE, October 27-28, at the Hotel Statler in St. Louis.

The Board of Directors of the NSPE welcomed to its meeting the Board of Directors of the Missouri Society of Professional Engineers and had the privilege of hearing a few words of greeting from Mr. P. Burke-Gaffney and Mr. M. Barry Watson, President and Secretary respectively of the Dominion Council of Professional Engineers, who were at the session.

There was extensive debate on the subject of dues. The $7 dues for 1947 were approved, and the previous action of the Board raising the dues to $10 was authorized to go into effect January 1, 1948.

Mr. John Kennedy, Director from Ohio, reporting on the participation of NSPE Committee of the Economic Status of the Engineer, presented for the consideration of the Board the policy regarding Labor Activities as prepared by that committee. Since the Engineers Joint Council derives its authority from the approval of its actions by the Board of Directors by those participating societies, Mr. Kennedy outlined the status of this labor policy as had been noted by the other societies and recommended to the NSPE that it endorse these principles as the policy of NSPE. Such endorsement was given by vote of the Board

(*Continued on page 22*)

NSPE President Lawrie Addresses Meeting With NCSBEE In St. Louis

Insists Engineers must lead themselves—Must accept full professional status to survive—Technology without social responsibility not enough —Future of profession depends on functioning of overall organization.

The fellow I meet each morning in the bath-room mirror has a most disconcerting habit of asking all manner of difficult questions . . . Recently, he has been inquiring: "Will the engineering profession survive or perish?" . . . "Will the public in future years look upon engineering as a profession?"

Mathew Wohl of the A. F. of L. believes he has the answer to these questions, for recently he said: "The trouble with you engineers is that you fancy yourselves as professional men. Actually, you are just hired help."

Are we engineers going to permit Mathew Wohl to answer these questions for us? What Mathew Wohl — or for that matter an other outsider — has to say, may be of interest but fortunately for the future welfare of the profession it is by no means controlling.

"Inside Job" Called For

The answer to these questions depends upon what we do — when we do it — and how we do it. In short, there is an inside job to be done by the members of this profession, by you and by me. Now I think you know what I mean by an inside job — but just in case — I mean simply this: we must awaken the engineers of this nation to a professional consciousness. That is what we have to do. And as to when — we must do it now. But as to how to do it — aye, there's the rub!

Since the enactment of the State Registration Laws much progress has been made in the establishment of engineering as a profession. As a matter of fact, the engineering profession is the creature of our registration laws. No laws, and most certainly it will follow — no profession.

As to the administration of these laws, you State Board Members I am sure will agree with me that the effectiveness of engineering as a profession is directly related to the individual engineer's degree of acceptance or professionalism and his reaction to the practice of professional ethics. Without a professional consciousness, there can be no profession.

And I suppose also you will agree with me that in the promotion of professionalism we should begin at the beginning — with the student engineer. To relate a personal experience, ancient history though it be, I cannot recall during my four years of college that engineering was ever referred to as a profession. There was never any mention of it. Perhaps this situation has changed somewhat. However, I am quite sure that my experience then is the experience now of many, if not most of, our engineering students today.

Ritchie Lawrie, Jr.

In this day of quantity production of engineers of many kinds and types, accredited engineering schools and colleges should inaugurate effective courses explaining and pointing the way to registration and presenting the real meaning of professionalism. We should urge that this be done without delay.

And after graduation, as a second step in the program, it is necessary that we follow through in seeing to it that these young graduate engineers become registered at the earliest possible moment — early registration should be a MUST item.

And we most certainly should extend a cordial invitation to these young fellows to affiliate with our engineering societies — the appropriate technical society — and, of course, N.S.P.E.

Must Cultivate Interest of Young Engineers

It is imperative — it is essential to the future existence of the profession — that we gain the interest of the student engineer and thereby be assured of the good will and support of the graduate engineer. We simply cannot, under any circumstances, neglect these engineers of the future.

So much for the youngsters. How about the so-called "oldsters"? How are we going to awaken thousands of these complacent, apathetic, indifferent, older fellows to a professional consciousness? As I see it, the solution to this problem — for many of them are problem boys (and incidentally, it will be well to remember that regardless of age, at heart they are still boys) is to be found in individual personalized action. We should approach them as man to man. Preferably, such an approach should be made in a selective manner; by one friend to another, or by one associate to another. These engineers are known to all of us. Let's go after them, one at a time; let's get them into our meetings; let's gain their interest and bring them one by one into the professional fold.

Just as all sinners are not saved, all of these older fellows will not be won over; but some can be, and for these

it will be well worth the effort.

To do this inside job, first of all we ourselves must be prepared. We must be informed. We must understand our profession. We must know all the answers. We must have faith in our profession and its potentialities. We must believe in it. We must, in a sense, meet this challenge with a crusading spirit. And finally, we must be articulate — prepared to talk it up — and put it across. If we set our minds and our wills to the task — we can do this job.

Webster defines a profession as — "An occupation that properly involves a liberal education or its equivalent, and mental rather than manual labor".

With all due respect for Mr. Webster, to put it mildly the definition appears to be a bit narrow, for the practice of a profession — professionalism — means much more than being proficient in an occupation involving a liberal education and mental prowess. As important as such attributes are, it seems to me that the practice of our profession has to do with our relationships with our fellow man in our day to day activities. It has to do with our attitudes and our behavior — as between employee-employer, practitioner-client, competitors and government, at the local, state, national and international levels; and last, but by no means least, our relationships with the public.

It has to do with our contribution to the social, civic and political welfare of our home town, our nation and our nation and our one world.

All of these important relationships should command our constant consideration, attention and action.

Technology Not Enough

But when we undertake to write the score of our achievement in social, civic and political affairs, there is little to record. When, however, it comes to technical knowledge, to engineering "know-how", the engineers of this nation are second to none. No one questions the part the engineer has played in providing shelter, transportation, commuincation and the production of food stuffs. There is no question as to the part played by the engineer in World War II in the design, production and transportation of war materiel and equipment and in the effective utilization of all such materiel and equipment on the home front and at the battle front. There is no question as to the part the engineer played in the employment of radar, electronics, and in the development and perfection of the amazing atomic bomb. Our ability to create and direct the operation of all manner of facilities and machines, not only for the well being but for the destruction of mankind as well, appears to be unlimited.

Responsible for these modern war and peace-time instruments, we simply cannot continue to produce them forever and forever and refuse to concern ourselves with their terrific impact upon our civilization. We must participate in determining and putting into effect ways and means for adequate controls.

In meeting the challenge of these tremendous issues, the world sorely needs the advice and help of the professional engineer.

And so, the individual engineer must awaken to a professional consciousness, attain a professional status, and with vision, pep and enthusiasm step out of his limited engineering sphere into the complex, fast-moving world of to-day. The individual engineer, having determined to act, must unite with others of like persuasion if success is to be assured.

Why NSPE?

At this point, gentlemen, the N.S.P.E. comes into the picture. For:

1. Its organization is democratic in form, paralleling the nation's political sub-divisions at the local, state and national levels.

2. Its membership unit is the individual registered professional engineer, regardless of technical branch or affiliation.

3. Its members determine its policies by voicing opinion at the local, state and national levels.

4. It is a modern, streamlined organization, committed to the improvement of the professional status of the engineer.

It is striving for the support of all registered professional engineers. Its efforts will continue to succeed in direct proportion to the support received.

Will the engineering profession survive or perish? Will the public in future years look upon engineering as a profession?

The answer to these questions rests within ourselves.

In closing, I wish to sound a note of optimism, for I am confident that the engineers of America will find themselves and with unity of purpose will press on to the high mark of their professional calling in an organized endeavor, highly prized by those who compose it, and better understood and better appreciated by the people of America.

Supply and Demand— Of Engineering Graduates

The September issue of the Journal of Engineer Education contains an exhaustive report on "The Outlook in the Demands for and Supply of Engineering Graduates," which was presented at the 54th annual meeting of the American Society for Professional Engineering Education, St. Louis, June, 1946.

In the same issue of the Journal appears an article, "Engineers Wanted," by Reginald C. Price, which deals with very much the same problems. The following conclusions are based on data taken from these two very informative articles, with the permission of the Editor of the Journal.

Deficit in Engineering Graduates

The deficit in engineering graduates through 1945 has been very conservatively estimated at 8 thousand. The 1946 production may reach 7 thousand. Since the annual needs for each of the next four years have been put as 23 thousand, the net deficit of 1946 will be over 25 thousand.

On the basis of the available estimates, the deficit of engineering graduates will have been wiped out by 1952. This means that the need for continuing engineering education at an overload level will lessen beginning with the entering freshman class in 1949.

On the other hand, it is pointed out, future developments on the political, social and economic fronts will have a marked effect on both the potential supply of and the demand for technical personnel. Not the least of the possible factors to be considered is the continually growing clamor of labor for higher wages or a shorter work week or both. This development serves as a reminder that engineering progress in the past has been respon-

(*Continued on page* 20)

Employers, Employees and NSPE

By T. S. Thompson, Secretary

Minnesota Association of Professional Engineers

Published in THE BULLETIN of the Minnesota Federation of Engineering Societies, for September, 1946. Reprinted here with the permission of the Editor and Author.

Editor's Note—In this brief editorial Mr. Thompson gives the engineering profession a thoughtful discussion of one of our most fundamental organizational problems. This issue of the Employer-Employee relationship among members of the same professional engineering group is one that must be dealt with wisely in the future. Every engineer reader of the American Engineer will do well to give careful consideration to the issues which Mr. Thompson raises. Again we suggest, if you want to express your individual reaction to what you read in these pages, write us a letter for publication.

The engineering profession as represented by M.A.P.E. and N.S.P.E. has organizational problems that are peculiar to itself and are not possessed by other major professions.

These arise from a mixed membership of employers and employees. Many employee engineers feel that an organization so composed cannot succeed because of divergence of fundamental interests. They feel that leadership will naturally be retained by the employer group and that the major policies and actions will be favorable to it. They have often seen examples of employer engineers not providing the working conditions that are advocated at Association and Society meetings and feel that actions speak louder than words.

The writer does not agree with this viewpoint and does not think that mixed membership is necessarily critical. However it is realized that N.S.P.E. does have a disadvantage that the American Medical Association and the American Bar Association, to mention two, do not have and that the situation has possibilities of disunity if certain understandings are not reached and certain actions taken. It is for this reason that this composite viewpoint of numerous employed engineers, particularly those in the lower pay brackets, is here reported and commented upon.

M.A.P.E. and N.S.P.E. are considered as one. Reference to either includes them both.

T. S. Thompson

Mr. Thompson is a charter member of the Minnesota Association of Professional Engineers; Past Secretary of the Hennepin County Society of Professional Engineers; Past President of the Hennepin County Society of Professional Engineers. He is at present employed as an engineer with the Urban Plans and Surveys department of the Minnesota Department of Highways.

Objectives of NSPE

The primary objective of N.S.P.E. is to have one organization capable of and willing to speak for and represent all registered engineers. During the past year or two there have been repeated rumblings from various groups that indicate a feeling that N.S.P.E. is either unable or unwilling to do so in an effective manner. These have been from employee groups and carry the implication that N.S.P.E. policies are controlled by and benefit the employer groups. For the purpose of this discussion, the term employer also includes those persons in administrative and executive positions which carry the responsibilities of formulating wage and working condition policies and those who supervise groups of engineers.

It is only natural that many M.A.P.E. and N.S.P.E. officers and leaders should come from the employer groups. Their presence in this group is evidence of their ability and leadership. If policies have been formed which seem adverse to the interests of employees, such action has not been deliberate but rather is perhaps a failure to realize that the make-up and the needs of the engineering profession are different from those of the medical, legal and dental professions whose organizations and policies have been used as guides.

The members of these three professions practice as individuals and in most cases sell an individual service to an individual client. Engineering knowledge unlike medical and legal knowledge can be converted into service only thru the medium of business. It is this fundamental requirement that dictates that engineers are now, and likely always will be, predominantly employees. For this same reason engineers will never be able to control their profession in the same manner nor to the same extent that the big three does.

Consulting Engineers, Doctors and Lawyers

Among engineers, those that most closely resemble doctors and lawyers are the consulting engineers. They practice as individuals, as partners, or as officers of a corporation, on a fee basis. However the service that they render is not personal in the same sense as that rendered by a doc-

tor or a lawyer. Here again some business medium is necessary to convert their knowledge and service into something that can be of use to an individual. No one ever comes to an engineer with anything so simple or so personal as a blackeye or a toothache.

The person to person basis on which doctors and lawyers practice frees them from the influence of the medium of business which is so necessary to engineering practice. Lawyers require the medium of the courts for some of their practice but this medium is to a large extent controlled by them. The same is true of the hospital medium needed for a part of a doctor"s practice. Engineers cannot dominate their medium and cannot practice on a person to person basis. Therefore the means of promoting their welfare must be different. Only certain features of big three organizational activities are applicable to N.S.P.E.

Public Respects Engineers

It does not follow because of this difference in manner of service, that engineering as a profession need take a back seat for the others. The writer's own opinion is that the public has more respect for, and confidence in, engineers as a group than it has for doctors, lawyers or dentists. This in spite of the fact that, individually, engineers are not nearly so well compensated for their contribution to society.

Nor does it follow that certain engineers as individuals are not on a par professionally with the best doctors and lawyers in the land. However likewise it does not follow that all engineers duly registered and belonging to N.S.P.E. can hope to obtain the same economic position and social status enjoyed by members of the A.M.A., A.B.A. and A.D.A. Fundamental difference make this impossible.

And so it is with the overall organizations which represent the professions. N.S.P.E. may in time be able to effectively speak for a large majority of engineers. However it cannot gain this position by the same methods that A.M.A. has used nor will it ever be able to dominate engineering to the same extent that the A.M.A. does medicine. There is no doubt that the economic situation of members of the A.M.A., A.B.A. and A.D.A. has been enhanced by certain restrictive actions enforced thru the associations. This is foreign to the education, training and practice of engineers, all of which emphasize production in abundance. Mastery of such subjects as physics, chemistry, mechanics and mathematics makes clear the folly of trying to get something for nothing.

Even though the engineer were inclined to be restrictive, business and the public would not stand for it. Many people will put up with decayed teeth, or none, struggle for a lifetime with poor health and die without a will in order to own a radio and operate an automobile. People usually go to a doctor, lawyer or dentist when they are in trouble. From the engineer, they expect the more abundant life.

In order to gain the 100,000 members that N.S.P.E. should have in order to effectively represent and authoritatively speak for a large majority of engineers, it must be able to serve the needs of all engineers, not just the needs of the employee group or the needs of the employer group, or the needs of those engineers that the law specifically requires to be registered. This goal can be achieved by a complete understanding of each group's problems, a sincere desire to cooperate, much hard work and some compromises.

Employers Need Engineers, And Visa Versa

The employee group must realize that they need the prestige, guidance and leadership of the employer group. They must be willing to be more active in the affairs of the organization and more ready to offer solutions to their own problems. Both M.A.P.E. and N.S.P.E. are set up for democratic action and members must be interested enough to take advantage of this. The employee group must not become impatient with the necessarily slower methods that a professional organization must use.

The employer group must realize that they are badly outnumbered and that they need the weight of numbers and the financial support of the employee group. They must be willing to forget some of their "professional professionalism" and realize American Medical Association methods are not all adaptable to N.S.P.E.

The older and wiser children in the family group are usually charged with the responsibility of keeping the peace. So it is with the case at hand. It would appear that the older and wiser employer group must take the lead in formulating and putting into action policies that will make it possible for N.S.P.E. to serve all those belonging to the engineering profession.

Employers Must Cooperate

These policies must not only be supported at Society meetings and by group action but must be supported by individual members of the employer group in their every-day dealings with the engineers they employ or supervise. Many employee engineers, members or potential members of N.S.P.E., feel that certain employing and supervising engineers, good members of N.S.P.E. though they be, are a most formidable barrier to better pay and better working conditions. In support of this the following is quoted from Col. Blake R. Van Lear writing in the January 1946 American Engineer. He states ". . . much of the exploitation of engineers has been done not by the public but by older and more experienced members of our profession who ought to know better and ought to do better." It is this condition that accentuates the disadvantages of mixed membership and which must be eliminated if N.S.P.E. is to serve all engineers. The common tie of registration is not enough. Neither is the goal of professional standing or recognition which is at present accorded doctors and lawyers.

It is significant to observe that even though there is now a great shortage of engineers, it is still necessary to combat unionization and that salaries in general are still much below what M.A.P.E. considers adequate. What will happen when the great flood of engineers is turned out of schools and colleges within the next few years?

Summary

To summarize, the fact that engineering knowledge requires a business medium in order to convert it to useful service, dictates that engineers are now and probably will be for a long time, predominantly an employee group. If N.S.P.E. with its mixed membership is to succeed in becoming the voice of the engineering profession, it must adequately serve both employer and employee groups. This

(*Continued on page* 8)

Court Rules on Validity Of Construction Contracts

Engineers on the West Coast are much interested in a recent decision of the Supreme Court of California, which deals with the right of a municipality to employ consulting engineers engaged in private practice. This opinion, handed down on July 5th, 1946, was rendered in the case of Clyde C. Kennedy, vs. Harry D. Ross, Controller of the City and County of San Francisco. The High Court ruling appears to clear all questions touching on the legal right of the Director of Public Works of San Francisco in awarding contracts to professional engineers in private practice for the preparation of plans and specifications.

Clyde C. Kennedy, consulting engineer was given a written contract on Sept. 24, 1945 to furnish engineering and architectural plans, specifications, and estimates of cost for the construction of the proposed North Point Sewage and Sludge Treatment and Disposal Plant and appurtenant works and buildings to be located in the Islais Creek district of San Francisco. The contract was approved by the Chief Administrative Officer of the City and by its City Attorney as to form.

However the Controller would not certify the contract without an expression from the Civil Service Commission as to its authority on endorsement of this contract. The Civil Service Commission referred the issue to the City Attorney for a legal opinion as to the limits of its authority. The City Attorney ruled that the Civil Service Commission had no authority in the matter, and so advised the Controller, who then certified the contract.

However when Kennedy submitted a request for his first payment on his contract it was found that a complaint had been filed against the Controller to restrain him from making any payment under the Kennedy contract, on the ground that the contract had not been authorized by the Board of Supervisors and that Mr. Kennedy had not been exempted by the Civil Service Commission pursuant to certain provision of the Charter. The Controller then refused to make payment.

Following this Kennedy filed a suit in mandamus for his first payment, and for the purpose of establishing the

(*Continued on page* 22)

Brain Twisters

*By Stephen A. Derry**

Civil Engineer and Management Counsellor

Editor's Note: We hope to run this feature regularly in future issues of The American Engineer. When you become wearied of the technological cares of the day, perhaps you can relax in a sort of "Busman's Holiday," by figuring out the answers to these problems from Engineer Derry's Brain Twisters.

Fishing Engineers Delirium

Two engineers (Hoby and Toby) took time out to enjoy some deep-sea fishing off the coast of the Bahamas. Each caught one fish and before they reached shore a heated discussion developed as to who caught the heavier fish. Much to their surprise the ship's captain reported that no scales were aboard ship. This did not bother Engineer Hoby for he determined the weight of the fish he caught as follows: First he balanced an iron bar across a vertical post in such a manner that the bar balanced with one of them on each end of the bar. Hoby exchanged places with Toby and this time the lighter engineer took the fish in his lap and the bar balanced. What was the weight of the fish? Hoby claimed his weight to be 160 pounds and Toby claimed 200 pounds as his weight.

Automotive Engineers Design Dream

Design engineer Joby came up with the following post war automobile. Said he, "Here is a car that will climb a 78 degree grade a mile long in low gear, fully loaded, at 15 miles per hour and this car will go down the same grade and same distance at such a speed that from beginning of the grade to end of the grade on the other side of the 'LENA THE HYENA' mountain, that the average speed from starting point to finishing point would be 30 miles per hour." What interested Joby was the speed this Jolopy went down the Lena the Hyena mountain. What was the speed?

Grazing Engineers Concatenation

Engineer Koby pitted four posts 100 feet apart in one of the pasture fields of TEXAS KING'S cattle ranch in such a manner that the posts formed a square. His associate, Engineer Coby tied a calf to each of the posts. The distance between the post and the calf, each measured exactly 100 feet. That night Engineer Coby stayed up all night trying to figure out not what area that each calf could graze over but what befuddled Engineer Coby was the area common to the four calves. Can you solve this without loosing sleep?

Tethering Engineers Laissez-Faire

Engineer Zoby acquired ownership of three stallions. He sent the stallions to Kentucky Colonel Bradley's famous farms for grazing. The trainer tied the horses to a post in a large pasture field. The distance between posts measured exactly 80 feet and the posts formed an equilateral triangle. The distance between stallion and post measured exactly 42 feet and this measurement proved to be the same for all three stallions. The trainer so educated these stallions that at no time would one stallion graze upon the same area as the other stallions. Engineer Zoby failed to report to work one morning because he was wrapped up in determining the grazing space of each stallion. What would you say?

(*Check Your Answers—See Page* 12)

Employers, Employees and NSPE

(*Continued from page* 7)

can be done under the leadership of the employer group if the non-applicable methods of such organizations as the American Medical Association are forgotten and methods that are in keeping with the needs of employee engineers are used for their benefit.

The greatest contribution that can be made by the employer group is to practice in daily contacts with employees that which is preached at professional society meetings. Employees can make their contribution by better service, more loyalty and much more aggressive action in their own affairs as well as in those of the Society.

The Builders of the Bridge

By D. B. Steinman

The story of John Roebling and his Son, Published by Harcourt Brace & Company, New York. What is reprinted here is a condensation of a review of Dr. Steinman's work, by John Charles Riedel, Chief Engineer, Board of Estimate, Member, City Planning Commission, City of New York.

The life of a man born in the medieval walled town of Mühlhausen in Thuringia in 1806, during Napoleon's advance into Europe, has been woven into a fascinating story by the author, David B. Steinman, Doctor of Philosophy, and himself one of the foremost bridge builders of our era. The story concerns the designers and builders of that noble structure, the Brooklyn Bridge, spanning the East River between what were the cities of Brooklyn and New York, and now, since the creation of Greater New York, the Boroughs of Brooklyn and Manhattan.

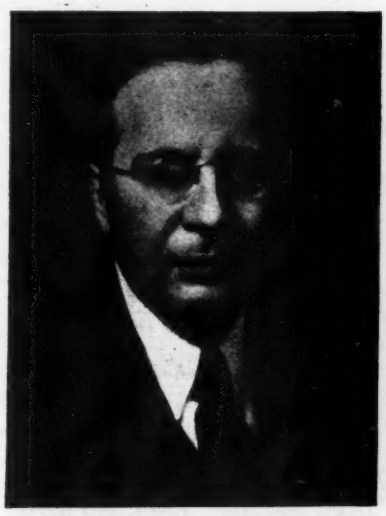
The author grew up in the shadows of the Bridge and his early life was strongly influenced by the majesty of the towers, the details of construction, the anchorages, the slip joint at midspan, the machinery of the cable railway and the magic of the radiating stays and the strength of the cables. Indeed this strong influence led the author to his life work, that of a builder of bridges. As a partial discharge of the debt of inspiration, the biography of the Roeblings was written.

The Debt of Inspiration

Undoubtedly the debt of inspiration was great, if judged by the pages of the book. The book is easy to read and holds one's attention constantly. The reviewer has been so strongly impressed that this outline is written with the hope that all young engineers, both those in training and those who have entered the engineering profession, will read and re-read this book so that they may absorb the story of one of the most fascinating biographies that has appeared. Older engineers will find the book to be of surpassing interest. They will be proud to be members of the engineering profession which developed men like the Roeblings, who carried on under the most adverse conditions to the successful completion of what was described in the 1880's as another Wonder of the World.

The story weaves in the history of members of the Roebling family, and were it not for the title one would fancy that the book was a novel of the most pleasing nature.

John Roebling was one of five children of a talented mother and a stolid, phlegmatic father. Four of the children patterned after the father, but John possessed his mother's active mind, quick intelligence and nervous energy. Through her efforts it became possible for John to receive training and education which fitted him for his life work. The boy's early life was spent under maladjustments of war-torn Europe, but notwithstanding these drawbacks the boy advanced early through the public school of Mühlhausen and into the Gymnasium, the equivalent of our High School.



Dr. B. D. Steinman

Following the advice of a former schoolmate he went to the nearby city of Erfut where he studied at a private school conducted by a famous mathematician. The boy completed his studies at Erfut when he was seventeen, and through the sacrifices of his mother he went to the foremost engineering school in the world at that time, the Royal Polytechnic Institute in Berlin.

Opportunities Limited

Roebling was twenty years old when he began his professional career. Opportunities in Germany in the 1820's were limited. The regime was autocratic and private enterprise was practically non-existent. He obtained his first job as Surveyor and Assistant Engineer with the Prussian Government on building of roads and small bridges in Westphalia. He soon discovered that Germany was no place for new ideas, and after three years of work sought to gain new freedom of opportunities.

John Roebling and his friends departed from Mühlhausen on May 11, 1831, for Bremen. The voyage to America was prolonged by storms, calms and head winds and the arrival at Philadelphia after seventy-six days occurred on August 6, 1831.

The year 1831 was important in the history and development of the United States.

The country was ready to embark on large engineering ventures and John Roebling believed there were opportunities for the exercise of his talents.

Roebling and his small band of followers remained for several weeks in Philadelphia and then left, travelling through the wilderness until they finally reached Pittsburgh, then a new town.

Roebling felt, however, that land-clearing and farming were not the kind of work for which he had prepared, although the hard outdoor life agreed with him. The small company was augmented by another group of settlers, among whom was Ernest Herting, his wife and three daughters. One of the girls was Johanna Herting, whom Roebling married in 1836 and who was an ideal wife for the young pioneer.

In 1837 there was born to the Roeblings a son, who was named Washington Augustus Roebling. Father and son were destined to become the famous bridge engineers of the nineteenth century.

First Roebling Surveys Made

For six years John Roebling carried on in the little settlement until he felt his obligation to his fellow colonists had been fulfilled. Through rather pathetic but providential circumstances he was offered employment on the Sandy and Beaver Canal. This was followed by engagements to make location surveys for a projected railroad across the Allegheny Mountains, and it is interesting to note that the pioneer location developed by Roebling for the State was followed in part for the main line of the Pennsylvania Railroad. While he was engaged in these surveys his active mind was occupied by mechanical inventions which he patented, and in engineering works—canals, river improvements, portage railroads and steam railroads.

Portage inclines had been devised in order to haul cargoes and boats over mountains separating navigable streams. Hemp ropes were used to haul these cargoes and boats, and frequently the hemp ropes failed, with consequent damage. Roebling felt that a rope made out of iron wire could be made with lessened cost and increased strength and efficiency, and the first wire rope was made in 1841 for use on the inclined plane railways.

The makers of hemp rope were much opposed to the introduction of wire rope and resorted to devious devices to discourage the new invention. Roebling made a wire rope or cable for use on the inclined railway planes of the Pennsylvania Canal. The opposition hired a man to cut Roebling's cable at a splice, and the cable failed during the test. Fortunately for Roebling's reputation, the sabotage was discovered by one who informed the President of the Pennsylvania Canal Commission of the foul act. This President, after learning of the incident, appointed Roebling as Superintendent of the Inclined Plane Railway. Thereafter Roebling was able to use wire cable with complete success.

Pioneered Wire Cable

He became the apostle of the power of wire and he applied his inventive genius and great vision in the design and construction of a suspension bridge to carry an aqueduct across the Allegheny River at Pittsburgh. The most significant feature was the construction of the cables in accordance with his new ideas. The cables were "solid and compact" and the important improvement of a "continuous wrapping" of wire around the cables was first applied. Roebling also devised and patented a new form of anchorage which was used in all of the bridges he subsequently built.

Following the success of the suspended aqueduct or canal he designed and built under the most adverse circumstances and trying conditions a toll suspension bridge spanning the Monongahela River. This bridge was used for all classes of traffic. Roebling first used on this bridge a system of inclined stays which introduced a strength and rigidity that was new to bridge building.

The fame of Roebling's work spread and engineers from all over the United States showed marked interest in his accomplishments. He continued with his innovations by the construction of suspension aqueducts over the Lackawaxen River for the use of the Delaware and Hudson Canal, then one of the chief means of transportation. He followed by building suspended aqueducts over the Rondout near its junction with the Hudson, and subsequently he constructed the suspension bridge for the Neversink Aqueduct near Port Jervis.

Engaged in Manufacture

Roebling in 1848 moved his activities to Trenton, New Jersey, and there established a manufacturing industry that revolutionized the making of wire and wire rope for many applications in civilized life, such as elevators in apartment houses, office and business buildings; in cableways for transportation of logs in the forest of the northwest; in haulage in tunnels and mines and shafts; in shipping and dredging. It is not easy to grasp how much the world is indebted to the invention and development of wire rope.

Notwithstanding the many activities in which Roebling became interested, he constantly looked ahead to the construction of suspension bridges of larger and larger spans, and the opportunity came when a railroad suspension bridge was projected across Niagara gorge. An engineer-contractor contemporary of Roebling had undertaken to build a railroad suspension bridge across Niagara and had failed to complete his contract. Roebling was called in and after four years of work under trying conditions completed this first railway suspension bridge in the world. Roebling wrote at the time that professional and public opinion had been averse to suspended railway bridges, but that he had demonstrated that *weight, girders, trusses* and *stays* made it possible to apply the suspension bridge to railway traffic.

While John Roebling was developing a new science in bridge building, his son, Washington A. Roebling, was growing into manhood and was attending the Renesslaer Polytechnic Institute, from which he was graduated in July 1857 with the degree of Civil Engineer. It is interesting to observe that his senior thesis was on "Design for a Suspension Aqueduct." The young engineer, following graduation, returned to Trenton and took up work in the Roebling mill. He assisted his father in the erection of a new suspension bridge over the Allegheny River at Pittsburgh during the trying times that preceded the secession of the southern states. The Allegheny Bridge, when it was finished in 1860, was generally regarded as the finest in the world.

From 1846 to 1856 the people of Cincinnati, Ohio, and of Covington, Kentucky, were agitating for a bridge across the Ohio River. In 1856 John Roebling was called to Cincinnati to take over the design and construction of a suspension bridge for mixed traffic. Financial stresses and adverse weather conditions delayed the work of construction, and with the opening of hostilities between the States in 1861, all work of bridge building was suspended.

Roebling Becomes Soldier

Young Roebling enlisted as a private in the New Jersey State Militia following the call of President Lincoln for 75,000 volunteers. Looking for more active service, he secured a discharge from the New Jersey Regiment and immediately enlisted as a private in the Ninth Regiment, with which he saw action at the front. He advanced

(*Continued on page* 21)

Engineering—Science, Industry, Or Labor?

By H. A. Meyerhoff

Republished by permission, from the September issue of THE BULLETIN, issued by the American Association for the Advancement of Science. Mr. Meyerhoff is a Geologist, now on a mission in South America for the United States State Department. He has been a Vice-President of A.A.A., and for eight years was secretary of the Geology Section of A.A.A.

During the past year the American Association for the Advancement of Science has had the welcome task of facing several problems with its affiliated engineering societies, and the experience has been illuminating and, it is hoped, mutually beneficial. In the past the ties between the engineering societies and the Association have not been as close as they might profitably be; but, for that matter, the engineers have not exhibited much coherence amongst themselves. Electrical, mechanical, civil, chemical, and mining engineers have each gone their diverse ways, applying their several specialties with only an occasional co-ordination of effort through the Engineers Joint Council. Industry has freely used their services but has logically felt little responsibility in guarding their special interests. The engineers, on their part, have drawn heavily upon the several fields of science without feeling any strong impulse to act jointly with scientists in the development of general scientific interests. They are, in consequence of this peculiar relationship, literally and figuratively 'in the middle."

Isolation is Weakness

Regardless of the numerical strength and the technological power any group may possess, splendid isolation is commonly an element of weakness, as the engineers have already discovered. More than twenty-five years ago, state governments opened a drive on the licensing of engineers, making a license compulsory for anyone practising within the confines of the individual states. In theory the procedure was reasonable, for it was prompted as a measure of protection against incompetence. But in practice licensing has had many inconvenient and even vicious aspects which have been remedied only in part. At times and in certain states local talent has been favored regardless of competence, and in such cases the public has received less protection rather than more. Few engineers have deep geographic roots, and to carry on a normal consulting practice they must be licensed in several states and must familiarize themselves with the legal requirements of all states in which they ply their specialty. Yet, when these questions first arose, their implications were but dimly appreciated; united action was lacking; and a heterogeneous and inequitable procedure was foisted upon the profession.

Within the past six or seven years the question of unionization of engineers in industry has arisen, and once again the profession is confused and disunited and—too often—uninformed and uninterested. Not long ago, a member of one of the regional engineering societies, following a long and varied experience in the labor field, offered his services to the organization for such use as its members might wish to make of them. The officials of the society lacked not only the wit to accept the offer, but even the courtesy to acknowledge it.

The Union Problem

More recently the American Society of Civil Engineers has become seriously concerned about the relation of its members to Unions, and its Washington representative appeared July 10, 1946 before a subcommittee of the House Committee on Labor to testify on behalf of professional men in relation to labor legislation. Engineers come into contact with labor unions in two distinct ways: (1) Practically every engineering project of any size calls for contracts with unionized crafts, and the planning, specifications, and contracting must be adapted to the labor situation which obtains locally. (2) Engineers not infrequently find early employment in shops and drafting rooms in which other employees are unionized. Under open shop contracts they have the option of joining the union, and under closed shop contracts they are compelled to join. It is with the second of these situations that the American Society of Civil Engineers is concerned, and some of its testimony may be quoted:

"The fundamental difficulty with present labor law as it affects professional employees is that it places professional employees and non-professional employees within one incompatible category. Their viewpoints and attitudes are inherently different. The abilities and work characteristic of professional men are not susceptible of standardization in accordance with non-professional criteria.

"Professional services are predominantly intellectual and are varied in character. . . . Technical skill is only a part of the equipment of a professional person. There is no yardstick by which creative ability can be measured. Regimentation of professional employees on the one hand and, at the same time, maintenance of true standards of professionalism on the other are impossible of joint attainment. Any law which can be used to restrict individual professional efforts hinders and restrains professional development.

". . . three specific points are of fundamental importance for inclusion in any legislation which establishes standards for collective bargaining between employees and employer, viz.:

(1) Any group of professional employees, having a community of interest and who wish to bargain collectively, should be guaranteed the right to form and administer their own bargaining unit and be permitted free choice of their representatives to negotiate with their employer.

(2) No professional employee, or group of employees, desiring to undertake collective bargaining with an employer, should be forced to affiliate with, or become members of, any bargaining group which includes non-professional employees, or to submit to representation by such a group or its designated agents.

(3) No professional employee should be forced, against his desires, to join any labor organization as a condition of his employment or to sacrifice his right to individual, personal relations with his employer in matters of employment conditions.

"Legislation which should cover these

three points, and cover them without possibility of contrary interpretation, would satisfy one of the avowed purposes of the present National Labor Relations Act."

No Engineer Is Immune

Civil engineers are more often brought face to face with state regulation and with Unions than engineers in other fields, and it is not surprising that their thinking has progressed somewhat farther along these lines. But electrical workers, mine workers, mill and smelter workers, oil field workers, machinists, agricultural workers are all partly organized. What is to keep electrical engineers, mining engineers, mechanical engineers, chemical engineers, or, for that matter, geologists, biologists, physicists and chemists who do economic work, immune to the problems of unionization?

There is, indeed, no reason why the civil engineers should face the situation alone among their professional colleagues, and no reason why the pure scientists, so-called, should bury their heads in the sand and hope the problem will bypass them. Engineers and scientists have comparable training and comparable standards of precision and ethics, and they both make a living by means of their professions. The academic scientist may tend to view unionization with more detachment and idealism than his more "practical" colleagues in engineering and other industrial occupations, but by and large neither group has distinguished itself by its knowledge and scientific approach to organization within industry and in the teaching professions.

Unions Fulfill A Need

Organization has always had a practical objective—namely, the protection of workers' interests, which are usually defined as wages, hours, and working conditions. Where there is no need for protection, unions rarely thrive, though they may exist. It was during the depression that professional men first encountered the problem. Jobs were scarce and engineers were not.

Such industries as the automotive industry discovered that they could hire engineers in drafting rooms and shops as cheaply as they could hire experienced draftsmen and mechanics without engineering degrees. Engineers thus hired found themselves treated, not as professional men, but like their co-workers who lacked degrees. During the war the phenomenal expansion of industry called for the creation of unwieldly supervisory staffs. Engineers in supervisory positions were soon outnumbered by men with no formal training and were treated the same way. Organization followed, and usually the engineers found themselves in small minorities within large bargaining units. Many highly trained scientists, notably in the fields of physics and chemistry, were involved in similar situations.

Professional Men Do Need Protection

Thus the need arose for the protection of the interests of professional men not only with employers but also with the unions whose chief concern is with the non-professional worker. The academic scientist may be tempted to dismiss the matter as an evanescent problem in depression and in war, but he need merely refer to the reports of Committee A in the bulletins of the American Association of University Professors to learn that men in academic positions sometimes require the kind of protection that unions provide, and that some academic employers give every encouragement to their teaching staffs to organize in self-defense.

The problem is with us and it will stay; therefore it must be met and solved with intelligence and insight. Professional men have too large a financial investment in their education and experience to ignore protection of interests for themselves or for those of their colleagues who may need it. The American Society of Civil Engineers has led, but it should not be left to work out the solution alone.

Cooperation In Technological Field Is Badly Needed

The need for fuller cooperation among professional men in the fields of science and engineering is as pressing elsewhere as it is in the matter of unionization. The engineers foresaw the shortage of personnel in industry and in the classroom, and precipitated the effort to have Selective Service appropriately relaxed. Through the work of the American Council of Education, the Office of Scientific Personnel (NRC), and the Association, a wiser policy of Selective Service has recently been put into operation. But the academic scientists, though distraught in departments which were understaffed, over-enrolled, and overworked, took little part in the effort, either individually or collectively through their societies.

Apathy Among Engineers

The engineers, on the other hand, have assumed too little responsibility in informing their scientific colleagues regarding the scientific aims, achievements, and requirements of the engineers. For example, the Secretary of the Association's Section on Engineering has advised the Washington office that the engineers of New England have shown neither the disposition nor the desire to participate in the Boston meeting. Thanks to the Navy's Office of Research and Inventions there will be a significant engineering program, but it is regrettable that civilian engineers feel so little concern about meeting with professional colleagues in allied fields of science.

The times demand co-operative effort, and it takes two to co-operate. The current problem of unionization has shown the engineers that, as a group, they are not industrialists by virtue of being engineers, or they would not need to protect their interests in certain industrial situations. They are not laborers, for their special and expensive mental equipment makes the usual labor contract inapplicable to their peculiar problems in industry. They are, in fact, professional scientists whose creative skill ranges over many fields in the application of scientific discovery and it behooves them and the academic scientists to work jointly on the solutions of such common problems as licensing, personnel, unionization, UNESCO, and even such mundane affairs as joint sessions at A.A.A.S. meetings.

Answers to Brain Twisters

(*See Page 8, for Problems*)

1. Fishing Engineers — 90 pounds. (One fish was plenty).
2. Automotive Engineer—This is the best definition of infinity that can offer you. "Infinity" is the correct answer.
3. Grazing Engineer — 350.163 square yards. (Slip stick answer).
4. Tethering Engineer — 889.337. (Stick slip answer).

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*(*The author is interested in collecting as many varieties of solutions to each problem as are possible. If you have other solutions than those given here, please mail them to the author, in care of, Engineering and Industrial Station, University of Florida, Gainsville, Florida. Thank you.)*

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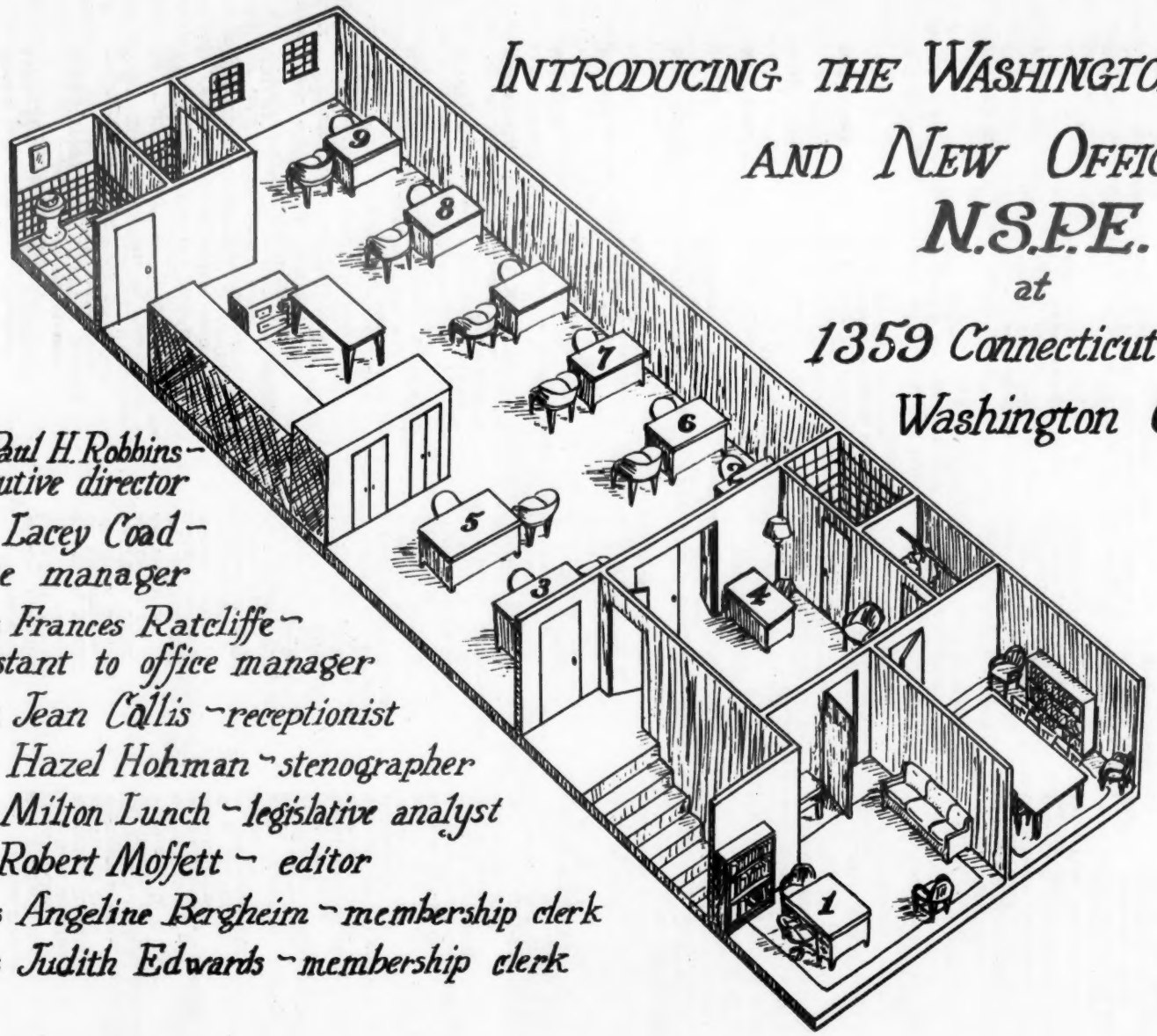

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WISCONSIN	EDWIN W. SEEGER P. O. Box 464 Milwaukee 1, Wisconsin	O. J. MUEGGE 656 Crandall St. Madison 5, Wisconsin	L. E. PETERSON 312 E. Wisconsin Ave. Milwaukee, Wisconsin

Kindly report any errors or omissions to the Editor.

National and State Society News

News From The Washington Office

By Paul H. Robbins
Executive Director

The growth in membership of NSPE fell off somewhat during the last month, but still continues to show a sizeable increase. As of November 1 the membership in NSPE totaled 13,494.

The results of the membership campaigns initiated in the majority of our states with the beginning of the fall activities have not yet begun to reach the Washington Office, but it is expected that when these results are received that the upward trend of membership will be accelerated.

The new offices of NSPE, a diagram of which appears elsewhere in this issue of the American Engineer, have facilitated the work of the Washington office considerably. Space is now available for expanding the program of NSPE during the next year and with the increased dues it is expected that this program will be activated at the earliest possible moment.

It will be noted that there is now available a conference room in Washington which will be utilized for various committee meetings and as a reference room for members of NSPE. It is also available as the Washington office of NSPE members who desire conference room space on visits to the National Capital. All members are most welcome at any time to utilize the new facilities. Some new equipment is also being received in the Washington Office which will permit greater service to members and will facilitate the routine and clerical activities connected with the administration of the Society.

Members of NSPE continue to visit the Washington Office in increasing numbers and it is hoped that all who come to the National Capital will visit the new quarters and will become acquainted personally with the staff of the Society. Comments and helpful suggestions continue to be received and are most welcome in improving the administration of the Society.

Mrs. Coad and the Executive Director attended the Board meeting in St. Louis and a good portion of the activities in the Washington Office appear in the report of this meeting.

Coming Events To Remember

There is a demand from readers of The American Engineer for more material which would be particularly helpful to the Engineers-in-Training, as well as to the other younger members of the Profession. Comment has been made that most of what appears in our pages is directed chiefly to the more mature and experienced engineers. Obviously the real future of the profession of engineering, as well as of the nation itself, rests with the younger men. Many of these are now just getting their bearings in a world of rapid, albeit reluctant change. Therefore, it would seem that now is the time for thoughtful engineers, perhaps with minds bursting with a message for the future well-being of the engineering profession, if not for the world at large, to get the thing off their chests, via the eager pages of The American Engineer.

In the November issue, under this head, we made a few suggestions as to general topics, but of course most contributors would prefer to choose their own subjects. Everyone in the profession agrees that we need discussions in our pages dealing with the pressing problems of professional organization. The National and State Societies need practical ideas for bringing in more members and for maintaining the fervor and continued activity of the present membership, both old and new. It's a big field, the harvest is "white," but the contributors are too few and far between. Some of the most able membeers of NSPE are far too modest; they feel that because their contributions have appeared a time or two in past years, that therefore, they should let others keep the good work going. Our rapidly expanding membership needs the seasoned counsel of the older members of the profession, quite as much as that of those with perhaps the fresher point of view.

When sending in editorial material, please note the change of address of our Washington office to 1359 Connecticut Avenue, N.W., where all items for publication should be sent.

State Meetings

Jan. 10-11, Annual Meeting, Pennsylvania Society of Professional Engineers, Roosevelt Hotel, Pittsburgh, Penna.

Jan. 10-11, Annual Meeting of the Oklahoma Society of Professional Engineers, Skirvin Hotel, Oklahoma City. This is Oklahoma's 12th Annual Convention.

Jan. 16-17, Eleventh Annual Meeting, Texas Society of Professional Engineers, Hotel Adolphus, Dallas, Texas.

Jan. 24-25, Fourth Annual Meeting, the Wisconsin Society of Professional Engineers, Hotel Pfister, Milwaukee, Wis.

Jan. 24-25, Annual Convention, Illinois Society of Professional Engineers, Abraham Lincoln Hotel, Springfield, Illinois.

Feb. 26-27, Annual Meeting, Minnesota Association of Professional Engineers, Radisson Hotel, Minneapolis.

Feb. 26 to Mar. 1, Minnesota Federation of Engineering Societies — Exposition and Conference, Radisson Hotel and Armory, Minneapolis, Minn.

March 20-22, Ohio Society of Professional Engineers Annual Convention, Deshler Wallick Hotel, Columbus, Ohio.

May 2-3, 20th Annual Convention, New York Society of Professional Engineers, Hotel New Yorker, New York, N. Y.

Massachusetts Society Issues a Progress Report

The Massachusetts Society of Professional Engineers has issued a very inexpensive 12 page multilithed pamphlet outlining the recent activities and progress of each of the Society's fourteen principal committees. Each committee chairman reports briefly on the service being rendered by his group, including the nature and scope of the work planned in the months just ahead. For instance, the chairman of the legislative committee report contains the five recommendations for changes in the State Registration Act, which we have reproduced under the head of Massachusetts State News, in this issue of The American Engineer. This project strikes us as a decidedly useful bit of publicity for the Massachusetts Society which has been very well received and nicely executed.

Report of the World Technical Congress Available

Professional Engineers who read the French language and who are interested in the proceedings of the International Technical Congress, which met in Paris Sept. 16-21, may want a copy of the official report covering these meetings. The Washington Headquarters Office has received a few copies of this official publication which we shall be glad to send to any professional engineer on request, so long as the very limited supply lasts. The entire report is printed in the French language. Reference to the Paris meeting will be found in August and September issues of The American Engineer.

Scientific Personnel Vacancies Open In The Navy

The Washington Headquarters Office has received from the U. S. Navy Department the October-November issue of the "Scientific Personnel Bulletin," "SPD-SERIES No. 10," which lists several hundred vacancies soon to be filled. These openings are distributed over 32 job titles, with pay scales ranging from $2,644 to $9,975 per annum.

In addition to listings of sub-professional and professional positions open, the Bulletin mentions vacancies for "Occupational Therapists, Statisticians, Management Analysts, and Industrial Engineers, with pay scales ranging from $4,149 to $6,500.

Interested persons should contact one of the District offices of the Civil Service Commission, or the Washington Office of that Commission, for circulars describing the various positions and giving the qualifications required for the type of opening for which they may consider themselves qualified.

Engineering Curricula Approved

The Engineers' Council for Professional Development, for the first time, has accredited the Curricula at three technical institutes: Wentworth Institute, Boston; Bliss Electrical School, Washington, D.C.; and Capitol Engineering Institute, Washington, D.C.

The Council is a project of the Engineering Foundation and was organized to enhance the professional status of the engineer.

The following curricula in the three schools were accredited: architectural construction, electrical construction, machine construction and tool design, and steam and diesel engineering at Wentworth Institute; fundamentals of industrial electrical engineering at Bliss Electrical School; and practical radio engineering, both resident and correspondence course, at Capitol Engineering Institute.

Some people apparently consider wars as an Act of God in one of His bad moods.

One big reason we have so much bad government everywhere is that the population of nations is composed of a politically conscious minority and a large politically indifferent majority.

The average freight train in 1944 consisted of 53 cars, compared with 39 cars in 1924. The average freight train load in 1944, was 1,138 tons, compared with 706 tons in 1934, and 647 tons in 1924. The maximum total employment on Class I railroads was prior to 1920.

DISTRICT OF COLUMBIA

Paul H. Robbins, Executive Director of the National Society, was our guest speaker at the November meeting of the D.C. Society. His topic was, "We Engineers," which he developed in a most entertaining and instructive manner. The chairman of the Activities Committee, Paul S. Dell'Aria did a fine job of arranging the program, which included plenty of refreshments. As a special feature there was presented a novelty musical program. The meeting place was the American Legion Clubhouse. Interest in the monthly meetings is increasing. We hope soon to announce a Regional meeting which is expected to be productive of very helpful results.

ILLINOIS

According to the minutes of the meeting of the Board of Direction held on September 7, the total membership, including all grades, was 1,498 on that date.

Decision was taken by the Board to cut off the military free list on January 1, 1947. It was considered that the permanent after-the-war status of all members would be established by that time thus justifying the move.

A meeting was held in Springfield, Illinois, on October 27, between the Directors of the Illinois Association of Highway Engineers and the Executive Committee of the Illinois Society of Professional Engineers to consider amalgamation of the two organizations. The plans are receiving further consideration.

Several proposed amendments to the constitution of the Illinois Society of Professional Engineers will be voted on in January.

On November 15 a meeting was held in Wewanee, Illinois for the formation of a local chapter of the Illinois Society of Professional Engineers.

The Commissioner of Public Works of the City of Peoria advertised for certain bids for professional work. The Society is actively protesting such a procedure.

MASSACHUSETTS

A meeting of the Massachusetts Society of Professional Engineers was held in Boston, October 4, 1946. Of special interest to the well-attended meeting was the extract of committee reports read by President Newton which indicated the formation of the Pittsfield, Connecticut Valley, and

North Shore local chapters of the Society. The meeting was addressed by J. F. Fairman, a Vice-President of the National Society of Professional Engineers, who spoke on "What This Society Has to Offer The Young Engineer." Mr. Fairman pointed out the chance available to the engineer to identify himself with this young Society with an opportunity to actively engage in the direction of its affairs. He emphasized the chance to help do a tough job and to help improve his chosen profession.

Mr. Fairman spoke also on the forms of organization of professional engineers and pointed out the fact that the society was an immediately available tool, for use now, to secure action at national, state, and local levels for the professional engineer. He spoke also of the lack of a simple definition of an engineer and made numerous references to popular misconceptions. It was obvious that considerable merit exists in the simplicity of a definition of an engineer, such as: anyone licensed by the state to practice.

At the conclusion of Mr. Fairman's talk the meeting was given over to a very interesting question and answer period.

Legislative Affairs Committee

The Massachusetts Legislative Affairs Committee of the MSPE, of which Charles T. Chave is chairman, has approved the following changes in the State Registration Act:

1. Elimination of the permissive features and substitution of compulsory requirements.
2. Arrangements to have the Board of Examiners appointed with the assistance and recommendation of registered engineers in Massachusetts.
3. Provision that the Secretary of the Board of Registration be placed on a regular salary basis.
4. Provision that the funds collected by the Board of Registration should be retained by the Board to be used for administration of the Act.
5. Provision that revocation of a license should be made by unanimous vote of the Board instead of by a vote of three members.

Ray M. Fuller, chairman of NSPE's Legislative Committee, addressed the December 13th meeting of the Massachusetts Society. He gave a general review of the history of state registration acts and made comments on the possible future trend of these acts.

North Shore Chapter

The second dinner meeting of the Organizing Committee of the North Shore Chapter of the M.S.P.E. was held at the Thomson Club, Nahant, Mass.

On a motion by Mr. Lynch it was voted that "conditional memberships" be granted to applicants for State Registration who have not received their registration cards, but that such members shall not be allowed the privilege of voting or holding office.

On a motion by Mr. Eichorn it was voted that all business dealing with the North Shore Chapter be cleared through the Secretary of the Chapter.

It was voted that the North Shore Chapter shall operate under the M.S.P.E. constitution and by-laws and any revisions or amendments thereof until it is found necessary to adopt a separate constitution and/or by-laws for the Chapter.

A report by Mr. Mitchell, Chairman of the Publicity Committee, recommended that every member of the Chapter consider himself an active member of the Publicity Committee, that publicity releases be confined to Chapter activities, and that a Program Committee arrange for prominent speakers on prominent subjects that will allow prominent publicity items.

MICHIGAN

The Michigan Society of Professional Engineers is continuing its active growth and we are expecting a considerable further increase before the first of the year. The larger percentage of the members of the State Society are in the Detroit area, and at our regular October meeting the formation of the Detroit Chapter was started with Arthur F. Plant as temporary chairman. An organization meeting was held on November 19, at the Rackham Building, Detroit, Michigan.

Michigan's first Chapter, known as the Saginaw Valley Chapter, had its charter presented by our State President, S. G. Szabo, to Paul Lemon, President of the local Chapter, at the Saginaw Bay Yacht Club, Saginaw, Mich. A group of 52 people were present for the presentation of the charter.

On October 11, a meeting was held in Lansing which was called by our first Vice-President, O. H. Hall. Mr. Hall and our National Director, Ivan N. Cuthbert addressed the meeting and outlined the object of our Society. The local group immediately voted to form a Chapter and elected Wm. Lanterman as temporary chairman and E. R. Hewitt, Post Office Box 298, Lansing 2, Michigan, as temporary secretary. Twenty engineers were present and a special meeting was called Monday evening, October 28, at which time committees were to be selected. An application for a charter was received from the Lansing group at the monthly meeting of the Michigan Society on October 23, and acted on favorably. December 2, has been selected as a date for the presentation of the charter. This No. 2 Chapter will be called the Grand Valley Chapter and will include Ingham and six bordering counties. William Peterman is chairman of the Constitution and By-laws Committee. The Chapter Constitution and By-laws are now ready for presentation to the State Society for approval.

A group of engineers was called together October 27, at Mt. Clemens, Michigan, representing McComb County and a second meeting is planned for Monday, November 11, at which time representatives of the State organization were present to assist this group. A meeting of the Washtenaw County Engineers is expected shortly with Professor Hugh E. Keeler of the Mechanical Engineering Department, University of Michigan, our second State Vice-President initiating the meeting.

Our State Secretary, Donald Trefry, turned in an excellent report regarding the activities at the meeting of state secretaries recently called together and President S. G. Szabo and National Director Ivan N. Cuthbert, attended the Board of Directors meeting in St. Louis, Missouri. This is the first board meeting at which a National Director from Michigan has been seated and we are aiming, in a short time, to have a growth that will give Michigan two Directors instead of one. With the present record we will probably meet this point in 1947.

We wish to thank the representatives of other states for their assistance in the formation of the Michigan Society of Professional Engineers.

MINNESOTA

Speaking of membership drives, State Chairman Swanberg reports that districts 6 and 7 have obtained 100 per cent of their quota. It is suggested that MAPE ought to try the plan used by the Ohio Society of organizing teams of two members each to make personal calls on every registered engineer who is not a member. Sounds like a good idea.

Frank McKellip recently reported at a District 2 meeting in Mankato that the Municipal Engineers met early in November and called in a group of County engineers to work with them. He stated that the Municipal Engineers are getting a great deal of help from MAPE and from Executive Secretary Price.

District 3 held a Homecoming Party for its returned war veterans at Izatys Lodge, Mille Lac Lake. Mr. Stolte, Dr. Price and T. S. Thompson from the Twin Cities attended. Highlight of the evening was Richard Price's stirring address on the engineers' responsibilities to the world during these difficult days. Lt. Bjestad and Lt. Com. Markson described their experiences in the services.

At a recent meeting of District 6, held at Wilmar, the following resolution was adopted: "Whereas the Medical Profession and the Legal Profession are explicitly exempted from the provisions of the Wagner Labor Act, now therefore be it resolved that legislation be enacted to exempt the engineering profession in like manner."

At a meeting of District 8 held recently it was voted to advocate a minimum of $50 a day for each member of the state registration Board during its sessions.

State President McWethy has appointed a committee to study the development of the natural resources of the State.

NEW YORK

Queens Chapter

The Queens Chapter is believed to be the first chapter in the Country to be offered a Group Insurance Plan. After a thorough study of the Insurance Committee's Report and other data the Board of Directors recommends that the Chapter make such a plan available to its members. Following final action by the Chapter the Plan will be offered to the members individually. Those interested will be able to get the benefit of the reduced rates offered while those not interested will have no obligation.

Nassau County Chapter

The first fall meeting of the Nassau County Chapter, New York State Society of Professional Engineers, was held Wednesday evening, October 2nd at the New Court House, Old Country Road, Mineola, Long Island.

One of the principal features of the meeting was the presentation by Chapter President, Engineer Roobert G. McDowell, of service scrolls to the following Past Presidents of the Chapter for serving the years shown:

Engineer H. C. Stevens—1931 to 1933, inclusive.

Engineer F. W. Saunderson—1935 and 1936.

Engineer F. W. Malkmus—1937 to 1939, inclusive.

Engineer S. E. Hunt—1940 and 1941.

Engineer John R. P. Goller—1942 and 1943.

Engineer Henry Waldinger—1944 and 1945.

The chapter was formed in the year 1929 and scrolls were presented to all but two of the Past Presidents, namely, Mr. Charles Lapp who served as the first President in 1930 but who was unable to attend this meeting and Mr. Arthur G. Archibald, deceased, who served in 1934.

A pin was also presented to Engineer R. P. Goller, Past President, indicating his affiliation with the National Society of Professional Engineers of which the New York State Society of Professional Engineers is a unit.

Niagara County Chapter

Dr. D. B. Steinman, was the principal speaker at the October 29th meeting of the Niagara County Chapter. As usual Dr. Steinman's story of "The Builders of the Bridge," went over in a big way. His talk was illustrated with beautiful colored slides. A dinner preceded the lecture.

At this Chapter's earlier meeting in October, Engineer Glen D. Bagley, chief chemist for the Union Carbide and Carbon Research Laboratories gave an interesting talk on his recent trip to Bikini where he witnessed the under-water atomic bomb test.

Engineer Edward Crean, a member of the Mayor's advisory committee on housing, stressed the need for additional housing facilities and urged that Engineers get behind a movement to promote housing units for Veterans.

The membership drive was begun in earnest when S. V. Jenkins, chairman of the membership committee, divided the members into teams according to plants where they were employed.

The October News Bulletin of the Niagara Chapter outlined a number of good reasons why all engineers should become members of the NPSSE. The News Bulletin is being mailed to members and non-members who are licensed P.E.'s.

Bronx County Chapter

At the October meeting of the Bronx County Chapter, Mr. Robert C. Weinberg, of the Citizen's Union, delivered an address on, "Subdividing the Boroughs into Districts." A lively discussion followed, indicating deep interest on the part of engineers and architects in civic matters of this nature.

The Public Relations Committee, through its Chairman, Henry C. Vermont submitted a comprehensive report which expresses the consensus of Chapter members. Among the comments were the following:

1. Permits planning of local areas around public and civic structures, so as to serve the public to better advantage, as citywide or regional planning often does not.

2. It was not felt that the proposed plan was adaptable to Bronx County, as it would tend to break up local developments in the various areas in line with the natural requirements of these areas.

3. The Committee did not agree that there would be any savings to the City by the consolidation of public services within the community.

4. The plan to consolidate library and other educational services was thought to have considerable merit. However, a study should be required to ascertain the extent of these advantages if any.

5. The suggestion for improvement of civic center facilities was considered as being in the direction of

meeting a real need in most communities.

6. As to the political changes the plan would require, these did not seem to be formidable, provided only that the aim is to benefit the majority of the people, and not special groups.

7. It was suggested that the benefits of the plan would be confined to the somewhat distant future, and that it would require good leadership by men of extraordinary vision to attain the results desired.

The Chapter's Executive Board was held on Thursday, November 7th, at the Concourse Plaza Hotel, with a membership dinner-meeting following.

Resolutions pertaining to changes in the Chapter Constitution, to provide for additional offices of Second Vice President, and Historian, changes in Annual Meeting Dates, etc., were presented.

The Metropolitan N. Y. Chapters held a joint get-together November 15, 1946.

It is a pleasure to announce that Engineer John A. Young, has consented to take over the duties of Publicity Chairman for the balance of the year, in place of Engineer Arthur Jovis, who, because of pressure of business has resigned. Best of Luck, "John". Regrets "Arthur" but many thanks for past efforts on behalf of Chapter.

Comprehensive Reports of Public Relations & Membership Committees were made at this meeting.

Erie County Chapter

"An Engineer Editor Speaks," (subtitled, "Us Engineers Don't Need No English,") was the title of a humorous address given before a dinner meeting of the Erie County Chapter at the University Club, November 18th. The Speaker was Dr. George E. Symons, associate editor, Gillette Publishing Company, who has a number of degrees in science and philosophy from Wisconsin and Illinois State Universities. Dr. Symons gave a humorous approach to the problem of writing engineering reports and technical papers.

Kings County Chapter

More than 75 members and guests attended the first meeting of the season of Kings County Chapter, at which the Executive Secretary of the State Society presented a descriptive picture of his manifold duties in this capacity, and the many intricate problems which are daily presented to him for solution.

Reporting on the progress made thus far by the proposed formation of an Engineering Societies Council, President Carl M. Gilt who presided at the meeting, stated that the question of our participation in such a Council is being given serious consideration by the State Society.

Reports were also submitted by Arthur A. Vioni, on the 1947 State Convention, and on the membership drive by the New York State Society in which all Chapters were urged to take an active part.

So far as Kings County Chapter is concerned in this respect our Membership Committee headed by Leslie Wax and our Service Committee, headed by Joe Lewin, are doing their utmost to bring about the desired results, and with the cooperation of the general membership they have thus far succeeded in adding new names to our membership rolls at every meeting.

Engineers-in-Training

In June 1946, 73 candidates took the Preliminary Examinations for Engineers-in-Training in N. Y. State, and of these 56 passed and were certified. This brings the total of certified Engineers-in-Training in N. Y. State to 284.

OHIO

Dayton Chapter

The membership chairman announces that as of October 15th, the Dayton Chapter has 212 members. Our goal for 1947 is 300 members. This objective will require the cooperation of everyone, since it is obvious that however willing the membership committee is, a lot of contacts will be necessary. Chairman Kline has intimated that a new hat goes to the person getting the most new members.

"Pre-Professional"—What do you think of this term, rather than "Engineers-In-Training?" State and National literature may shortly use this term, according to our information. Such a title might make a closer tie between student or recently graduated engineers and those already registered. This subject deserves thoughtful consideration.

The OSPE Board of Trustees has approved several amendments to the State Society's constitution, among which are:

1. Annual dues of active members to be $12, of which $5 are for the State Society and $7 for NSPE.

2. Annual does for Surveyor members shall be $5 which includes a subscription to The American Engineer.

3. Annual dues of Junior members shall be $4, which includes a subscription to the American Engineer.

The November meeting of the Trustees was noteworthy for one thing at least that more Chapters were represented than at any previous meeting in 1946. An increase of 87 in the State Society's membership for the month of October was reported. Akron Chapter still leads the nation in Chapter membership with a total of 447. The December meeting of the Trustees was changed from Dec. 6 to Dec. 13th, to enable officers to attend the NSPE Convention in Atlanta. Director Kennedy was given the authority to cast votes for the 14 or 15 delegates from Ohio.

During the month of October presentation of certificates to engineers were distributed at meetings of Chapters of Akron, Cleveland, Franklin County, and Ohio Northern.

A new Chapter publication, the "Toledo Engineer," made its debut during October. The Editor is A. E. Fryer who has made a good start with his first edition. He deseres the active cooperation of every member of his Chapter.

NSPE Director Jack Kennedy addressed a Dayton Chapter meeting in October. His topic was "The Economic Status of the Engineer."

OKLAHOMA

The Oklahoma Society of Professional Engineers decided at a Board of Directors meeting held in Stillwater, Oklahoma October 5th, to start publishing a monthly magazine, to employ a full time secretary, and to hold a two-day state convention in January.

The magazine will be called — "Oklahoma Professional Engineer" and the initial issue will have a circulation of 2,000 copies scheduled to come off the press in December.

The 12th annual state convention will be held in Oklahoma City Friday and Saturday, January 10 and 11, 1947. Headquarters will be at the Skirvin Hotel.

Engineer R. F. Danner was appointed to the Board of Directors of OSPE to replace Don McBride, who has resigned, due to transfer to Washington, D. C.

PENNSYLVANIA

The Western Division of PSPE is changing horses while crossing a stream. Dave Camilli has been so extremely fussy on his job that he has recommended the appointment of F. M. Schweinberg to succeed him as chairman of the Western Division. This change has been approved by the Executive Board.

Steps are being taken to secure registration lists more quickly after actual registration takes place. There should be 360 names a month for the remaining months of the year.

This membership campaign has a very important bearing on the self-interest of every man in our Society in two ways: First, we should have at least 50 per cent of the registered engineers in Pennsylvania if we are to claim to represent them as a Society. Second, for the budget requirements of an increasingly active Society, we must have more money coming in from dues.

At the recent Executive Board meeting in Harrisburg, the matter of the State President acting as National Director was brought up and a change was suggested. This change would have the State President become National Director *after* his term as President has expired, instead of the present method of having him act also as National Director during his term as President.

The PSPE State Constitution is being revised by our Committee on Constitution and By-Laws. The draft of the new document was submitted to the November meeting of the Executive Board for whatever action could be agreed upon.

State Society membership as of September 21st, was reported as 1,380, a gain of 109 members in the previous three months. Our State Executive Secretary reports that intense membership campaigns are now in progress in many sections of the State.

Five Chapters in the state of Pennsylvania now publish Chapter Bulletins. Two of these are printed and three are mimeographed.

Philadelphia Chapter

Dr. Rupen Eksergian, consulting engineer, was the principal speaker at the November Dinner Meeting at The Engineers Club in Philadelphia. His topic was "Future Trends in Engineering." An additional feature of the evening was a motion picture in technicolor, "Unfinished Rainbows," depicting the remarkable advances made in aluminum production and processing since the early days.

TEXAS

The Texas Society Executive Board has gone on record in favor of setting the State dues at $10 a year exclusive of the National Society dues. The rules committee has been instructed to prepare amendments to the By-Laws to permit this increase in the State Society membership dues.

The President of TSPE has appointed a special committee to study the State Registration Act and to suggest amendments to the Act which will increase its effectiveness.

State Society officials are keenly aware of the importance of becoming better acquainted with members of the State Legislature and steps are being taken to bring about better understanding and closer cooperation.

WEST VIRGINIA

A group of registered professional engineers from the vicinity of Whitesville, Pineville, Fayetteville, Hinton and Beckley, met recently at Beckley to discuss the feasibility of organizing a Chapter of the West Virginia Society of Professional Engineers to serve the territories in these areas. As a result of this discussion, Leslie C. Gates was elected as temporary President and J. B. Bigg as temporary Secretary Subsequently an application was made for a charter for a new Chapter, to be known as the "Appalachian Chapter of the West Virginia Society.

E. C. Smith, Jr., civil engineer, has been appointed special assistant to H. Dryden, assistant administrator in charge of the Veterans' Administration construction, supply and real estate services. Mr. Smith will have much to do with planning the construction of nearly a billion dollars worth of VA hospitals.

At the October meeting of the Charleston Chapter, Ross B. Johnston, Secretary of the State Society gave a short talk relative to the work of the State Society in establishing a new chapter at Beckley as part of the state-wide membership drive.

Supply and Demand of Engineers

(*Continued from page 5*)

sible in large measure for the improved standard of living.

Dr. Vannevar Bush's report, "Science the Endless Frontier," estimates the probable accumulated deficit of men with engineering doctorates due to the war, will amount to 1,000 by 1955. This is a deficit which we may be unable to overcome even by promptly embarking on remedial measures.

The ratio of M.S. degree in engineering to doctoral degrees in engineering is certainly not less than 5 to 1, having exceeded 10 to 1 in pre-war years. This would indicate a deficit of men with doctor's and master's degrees in engineering amounting to 6,000 by 1955.

The dean of a midwestern college of engineering reported in April, 1945 states his expectation that the number of civilian engineers graduated during that year was less than 2,000, made up largely of individuals physically incapacitated.

Dr. Linton Grinter, Illinois Institute of Technology, noted that only 2,940 senior civilian engineers have been enrolled in the fall of 1944. This is an ill omen when at least 100,000 additional engineers and scientists are needed if the country is to provide 60,000,000 post-war jobs.

"Builders of the Bridge"

(*Continued from page* 10)

in rank and within a year was a lieutenant.

While John Roebling had been busy with the construction of the Niagara Suspension Bridge and the suspension bridge across the Ohio at Cincinnati, he had been giving thought to a still greater accomplishment, namely, that of spanning the East River separating the cities of New York and Brooklyn. As early as 1852 he proposed such a bridge, but many years passed and the Civil War intervened before the matter developed to the point where the civil leaders of Brooklyn met in conference in a house near what is now Owl's Head Park in Bay Ridge, Brooklyn. From that historic meeting developed the movement, led by Senator Murphy, a former Mayor of Brooklyn, and William C. Kingsley, a prominent contractor and leading business man. Legislation was obtained and in 1867 John A. Roebling was appointed Chief Engineer of the proposed bridge. The work was financed by a company consisting of the most important citizens of New York and Brooklyn. Surveys were begun by Roebling in the middle of 1867, and shortly thereafter he sent his son, Colonel Washington A. Roebling, to Europe to make a thorough study of the then newly developed pneumatic method of sinking caisson foundations. He remained for a year and visited England, France and Germany, in which three countries important engineering works were in progress.

John Roebling proceeded with his plans and selected the line to City Hall Park in New York because it afforded the best grades and the best accommodations for traffic. In his initial report to the Trustees of the Brooklyn Bridge he laid stress upon the wide elevated promenade that has become famous to millions who have enjoyed it through the sixty years that the bridge has been in service. In this report he also made the revolutionary proposal to use *steel* wire instead of iron wire for the cables. This provoked much discussion, and had anything gone wrong because of the decision Roebling's reputation would have been wrecked.

Designed Tower Bridge Supports

The dominant feature of the finished bridge would be two towers which would be based on foundations that would be laid on solid rock if such could be found at reasonable depth.

Roebling also wrote in his report: "The contemplated work, when constructed in accordance with my designs, will not only be the greatest bridge in existence, but it will be the great engineering work of this Continent and of the age. Its most conspicuous feature—the great towers—will serve as landmarks to the adjoining cities, and they will be entitled to be ranked as national monuments. As a great work of art, and as a successful specimen of advanced bridge engineering, this structure will forever testify to the energy, enterprise, and wealth of that community which shall secure its erection."

The general public of New York and Brooklyn were incredulous and Horace Greeley of the New York *Tribune* and Mayor Kalbfleisch of Brooklyn expressed doubts that a bridge of such staggering proportions could be built. But Roebling stood steadfast, his Board of Trustees expressed their confidence in him, and the work went on.

In the early summer of 1869 a final detailed survey was under way. John Roebling was taking observations to determine the exact location of the Brooklyn tower. He was standing on a cluster of piles at the rack of the Fulton Ferry slip receiving signals from his assistant who was on the distant New York shore. He was oblivious that a ferryboat was entering the slip. The fender rack was forced against the piles and Roebling's foot was caught and crushed between the timbers. Immediate medical and surgical attention was given, but lockjaw set in, resulting in his death on July 22, 1869. Roebling was sixty-three years of age when he died. In the last few years of his life he felt physically spent. "He had exhausted his vitality on his unstinted outpouring of energy into his work."

The Son Takes Over

With the passing of John A. Roebling it seemed that it would be impossible for the bridge to be built. Roebling had been its designer but was much more. He had furnished the inspiration and the vision and had conceived the whole and knew every part. Dr. Steinman writes:

"By destiny or prevision the master builder had prepared a deputy who was indeed a part of himself—his own son, Colonel Washington A. Roebling.

"To this son the great engineer on his deathbed turned over the completion of the task. The following month—August, 1869—at a meeting of the directors, Colonel Washington A. Roebling was officially appointed to succeed his father as Chief Engineer of the work.

"Courageously and loyally the son assumed the gigantic responsibility of carrying forward the construction of this, his father's greatest dream. To this consecrated task the young engineer gave all he had—his health, his strength, his career.

"He resigned as president of the wire company at Trenton to devote all his time and energy to the bridge, and his two brothers, Ferdinand and Charles, took charge of the wire-rope plant. From that day until the job was ended, Washington Roebling lived only for the Brooklyn Bridge."

Caissons Presented Problems

The building of the caissons for the towers presented many new, increasing and never ending difficulties. Boulders were encountered and Colonel Roebling resorted to the new idea of blasting within the caissons. He spent many hours and days within the chambers and at length conquered the many difficulties and setbacks which had appeared. On one occasion the "Big Blowout" occurred when the compressed air suddenly blew out through the south shaft. Fortunately no one was in the caisson when the accident occurred and within a little while work proceeded within the caisson. On another occasion a fire took place in the caisson which was so serious that three months were required to repair the damage. Another incident took place when suddenly two supply shafts blew out. Colonel Roebling was trapped in the caisson with several others and due to his presence of mind the supply shaft doors were closed and order was restored.

During the sinking of the caissons, men were obliged to be under air pressures sometimes thirty-five pounds per square inch, and many became subject to attacks of the "bends." Several fatal cases developed and Colonel Roebling did everything that medical science of that time could prescribe.

Work Finally Completed

The Board of Trustees considered a proposal to supplant Colonel Roebling as Chief Engineer but did not act upon the proposal. Colonel Roebling through his wife appealed to the American Society of Civil Engineers, then in session, and through the eloquence of her appeal the backing of the profession was secured and the confidence of the public won.

The work was completed and the formal opening arranged for May 24, 1883. The work had required 13 years to build and it had cost over twenty lives. "Orators and writers paid their tributes to the significance of the achievement. It was hailed as a mighty engineering feat—the longest span in the world—the longed-for link between New York and Brooklyn—the promise of a Greater New York."

The paralyzed engineer watched the celebration through his field glasses and could only read the next day the dedication of the orator, the Honorable Abram S. Hewitt, later Mayor of New York.

" 'Yes, Brooklyn Bridge is beautiful. All the latent poetry of the mathematician—and in its highest reaches mathematics becomes divinest poetry; all the aestheticism of the architect; all the musician's sensitiveness to harmony; all the mysticism of an idealist philosophy; whatever of faith, feeling, reverence John Roebling cherished in his heart, was here voiced like a ringing cry. As if conscious of his pending doom, his genius stands embodied in this form—an aspiration visible—a soul's bid for immortality.' "

NSPE Board Passes On Dues

(*Continued from page* 3)

of Directors.

The Committee on Education, under the Chairmanship of Mr. Walter H. Wheeler, presented its report which recommended that the curriculum in our various schools be increased to a five year program. This too received the approval of the Board of Directors with a few dissenting votes.

To affectuate the program of policy approved by the Board in 1945, changes in the Constitution and By-Laws of NSPE were required. The report of the Constitution and By-Laws presented by Mr. Sam Sacks in the absence of Chairman John W. Shallenberger, recommended that there be presented for the approval of the membership the change in the Constitution which will permit the employment of an Executive Director and the appointment of a Secretary.

By action of the Board the By-Laws were changed, creating the position of Executive Director, outlining his duties, and permitting the Board to authorize the appointment of additional staff members under the direction of the Executive Director.

The many problems which the publication of the American Engineer have presented to the Society were outlined in detail by Mr. Larkin, the chairman of the Publications Committee. Mr. Larkin also reviewed the investigations and conferences which the Publications Committee have made since the last Board meeting, endeavoring to become as well informed on the publication problem as possible.

He also presented a request from the publisher to permit a revision of the present contract, but this revision was not deemed advisable at this time and the Board, therefore, did not approve.

Consideration was given to the admittance to membership in the NSPE of engineers who are residents of other countries and who are not registered in the United States. After some discussion it was believed that the NSPE could not at the present time properly evaluate this request and the item was tabled for future consideration.

A report of the plans for the annual meeting in Atlanta was given by Dr. King, the Director from Georgia. The Directors were assured that an extensive program was being planned and a most successful meeting is anticipated.

The Executive Director reported on visits to the West Virginia and Illinois societies and his recommendation that assistance be given these Societies in promoting membership in NSPE were approved. The Executive Director further reported that the Virginia Society apparently is without officers and has held no meetings for the past 18 months, that there are no members in active status in NSPE and as a result the Board suspended the charter of the Virginia Society pending active promotion and revitalizing of the Society at some future date.

President Lawrie and Executive Director Robbins reported on the Administrative details of the Society and Director Allen gave the Treasurer's report in the absence of Leo Cleary.

Court Rules on Contracts

(*Continued from page* 8)

legality of his contract.

The Consulting Engineers Association of California recognized the importance of this issue to every member of the Association, and induced the Supreme Court to review the issues and render a decision without the usual procedures of carrying it through the lower Courts.

The opinion rendered by the Court, dated July 5, 1946, has this to say in conclusion: "No question is raised as to the power of the City under its charter to proceed in the matter of sewage reductions, treatment, and disposal and the record shows that since the adoption of the new Charter, the Department of Public Works, the Chief Administrative Officer, and the Board of Supervisors have so construed its provision as not to require that contracts for expert and professional services be subject to the Civil Service Provisions, or the procedure of competitive bidding. The practice has been for the Director of Public Works to make such contracts with independent contractors upon the approval of the Chief Administrative Officer and without advertising for bids. There is no language in the Charter which may be said to require a different method of procedure. From what has been said it follows that the contract involved is valid and the petitioner is entitled to the relief sought."

The decision was unanimous and so sweeping in its language that there seems no question but that the proper administrative authority can henceforth make such contracts with consulting engineers who are properly qualified professionally, without the necessity for competitive bids being asked for, and without reference to the Civil Commission, under the present provisions of the San Francisco Charter. Charter provisions, obviously, would have to be complied with in every case.

It's strange how many people agree with Abraham Lincoln that ours is a "government of the people, by the people and for the people," yet who are afraid of giving the government too much power.

People's convictions seldom go higher than their knowledge and understanding. But often their convictions do fall to a lower level.

What's New For Engineers

Requests for further information concerning any item mentioned under this heading will be promptly referred to the manufacturer. It would be appreciated if inquiries be addressed on professional or company letterhead.

Send Inquiries Direct to American Engineer, #6 Church Street, New York, N. Y.

COLD RUN RESIN GLUE

This is the only type of resin glue that can be handled and machined after 20 to 30 minutes' clamping time, instead of the usual six to eight hours. Exhaustive tests in National's laboratories and two years' use and study in a wide variety of wood-working applications in the field, show it produces a strong, resilient bond unaffected by humidity changes.

This war-time "Resyn" development now made available to all wood-working industries, has many other outstanding points, according to the announcement:

It is cold-run; therefore, its bonding quality is never weakened by constant heating. It is a liquid, ready for use. Nothing has to be added, soaked or heated. It does not harden in the pot. Its characteristics never change during shipment, application or use. Its storage and working life is months, not three to four hours. It has no odor. It eliminates "chilled" joints; there is no need to heat the glue or wood, or to heat the room above a comfortable working temperature. It never embrittles nor forms a rock-hard abrasive film to dull saws and knives. And its fast setting speed shortens assembly lines and frees working space.

Colors range from uniformly controlled pure white, which dries colorless and leaves no glue line, to darker shades for special uses.

It is claimed that this new product provides a durable bond for every type of wood.

For further information address American Engineer, reference No. 533.

COMPARATIVE RESISTANCE WELDING ALLOYS CHART

A new chart entitled, "Comparative Resistance Welding Alloys" has just been issued. The chart lists by groups, classes and trade names, alloys produced by eight leading companies serving the resistance welding field. RWMA minimum properties for each group and class are also published.

The new chart serves to indicate clearly the comprehensive array of alloys available to the industry.

For further information address American Engineer, reference No. 534.

WATERPROOF ADHESIVE

A new synthetic, Waterproof Adhesive said to be more resistant to oxidation than simi lar natural rubber compounds was announced recently. The new cement is recommended for bonding Buna-N type synthetic rubbers and vinyl films or sheet stocks to rigid surfaces such as steel, aluminum, glass, wood, or concrete.

The new adhesive is a thermoplastic synthetic elastic composition that does not require vulcanization to obtain maximum adhesive strength. Oils or straight gasoline will weaken the bond strength only slightly, although aromatic hydrocarbons will destroy the bond. Unaffected by temperatures as low as 40°F., the new cement's adhesive strength is weakened at temperature of 160° F. and above. Full bond strength is regained, however, after coling to normal temperatures.

Cold-seting, the new adhesive will dry to a tacky surface, under average conditions, in three to ten minutes, and dry completely within two hours.

For further information address American Engineer, reference No. 535.

AUTO WHEEL LIFT

Aggravating attempts to make those elusive lug bolts pass through their holes while lifting an automobile wheel and tire into position inspired the inventor of this handy tool.

This simple but effective tool has been developed for the car tool kit to leverlift the wheel into the proper position so that the lug bolts drop into place. The operation follows these three simple steps: 1. Insert both prongs through the two bottom holes of the wheel. 2. Place the grooved prong ends over the tips of the two bottom lugs on the brake drum. 3. Lift handle till wheel drops into place on the uper lug bolts.

Ends of the prongs are designed for use with either a lug or bolt-hole type drum. The tool is equipped with a clamp for adjusting the space between the prongs so they can be made to slide freely through the holes of any automobile wheel.

For further information address American Engineer, reference No. 536.

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REPLACEMENT FOR METALS FINISHED IN BRASS AND CHROMIUM

According to a recent report, aluminum and its alloys can now be treated to very closely resemble brass and chromium. High reffective mirror effects are obtainable and after-lacquering is not necessary and the finished surfaces have good corrosion resistance (Govt. Spec. ANQQA696a) and abrasion resistance.

Instead of being a paint, lacquer, dyed or plated coating, the finish is not a coating at all, but is part of the surface of the aluminum which has been electro-chemically changed to produce the result. The surfaces are maintained by washing now and then with a mild soap solution. Polishing with metal polishes, etc. is not required or desirable.

The common aluminum alloys such as 2S, 3S, 52S, 53S, 56S, "Alclad" and "Pureclad" respond well to this treatment. They should, however, be free of scratches, draw and roll marks, etc. or these will appear in the final finish. A pre-finish equivalent to a 200 mesh (or finer) treatment results in uniform reflective surfaces after treatment. The economy and adaptability of aluminum and these finishes make this lightweight metal a top ranking choice for many products.

For further information address American Engineer, reference No. 537.

COMPACT UNIT SUBSTATIONS

High voltage incoming line, transformer, and low voltage feeder sections are combined in one compact assembly in a line of new Unit Substations now on the market. Installation is simplified, as the units are delivered ready to connect.

The new Unit Substations are standardized in ratings 100, 150, 200, and 300 KVA, 3 phase, 60 cycles. Choice of combinations of different types of transformers and high and low voltage equipment makes them suitable for a wide range of applications.

For further information address American Engineer, reference No. 538.

METAL PACKINGS

An illustrated folder, describing various types of Metal Packings has been just issued. This folder describes the metal packing most frequently used. The desirability of packings made to fit standard stuffing boxes is obvious when their advantages are understood as described in this folder.

For further information address American Engineer, reference No. 539.

MECHANICAL PRESSURE GAUGE

This new Pressure Gauge is compact in size: The 0-100 pound model measures 3-5/8" long x 2-7/32" high x 1-3/4" wide. It weighs only 1-1/4 lbs. net. The 0-250, 0-500, 0-1000 pound models al measure 4-5/16" long x 2-7/16" high x 2-5/16" wide. They weigh only 2 lbs. net. The 0-2500 and 0-5000 pound models measure 4-5/8" long x 2-3/8" high x 2-3/4" wide. They weigh only 2-1/2 lbs. net. All models are furnished with a strong wooden carrying case. Very shortly a 10,000 lb. capacity model will be added to the line making it even more complete.

The new gauge works in vises, between all types of clamps, can even be converted into a miniature testing machine. It is almost entirely unaffected even by extreme temperature changes and can be used indoors or out. In cases where the operator cannot get clse enough to read the dial, remote repeater stations that work up to 500 feet and more can be supplied.

This gauge can be used to check pressure between spot welding machine electrodes, pressure between platens in all types of presses, pressure between moving rollers, tension in a moving thread, twine, wire, etc. It has been purposely designed *small* so that it can fit into "tight" spots heretofore inaccessible yet where pressures of static or moving parts must be measured.

For further information address American Engineer, reference No. 540.

THE USE OF COLOR IN INDUSTRY

"Color Conditioning for Industry," is the title of a new 32-page booklet illustrated in full color, which is now available.

Illustrating and describing years of research and practical experience with color to increase production, improve seeing conditions and create a better working environment, the booklet makes clear the fundamental principles on which color conditioning is based.

The "Three-Dimensional Seeing" treatment of mechines is depicted with photographs of actual installations. The Safety Color Code for Industry is also outlined. Color Conditioning is shown at work in plants of several well-known companies. A coordinated functional color program for an entire plant is illustrated in a double-page cutaway drawing.

For further information address American Engineer, reference No. 541.

LUBRICATOR FOR AIR TOOLS

Specially designed for automatic lubrication of a wide variety of pneumatic equipment, a new type of Lubricator for Air Tools is announced.

Among the features of the new Lubricator are a full view, non-breakable transparent plastic window with "O" rings for top and bottom seals. The quantity of oil in the lubricator is visible at all times. Regulation of lubricant is accomplished by a needle valve located on the air outlet side. This regulator is easily adjustable to meet varying equipment requirements. The filler cap and adjusting aperture is located directly above the regulator valve. Since the Lubricator works only when air operated equipment is in use, the device is fully automatic, permitting only the correct amount of oil to mix with working air.

Full adjustability prevents oil flooding as well as oil starvation, eliminates freezing of pneumatic equipment and helps cut down maintenance repairs. The needle valve can be turned off altogether in cases where no lubrication is required. Available in ¼" and ⅜" standard pipe line sizes. Small size, compact design, simplicity and rugged construction make for easy installation close to working equipment, trouble free operation and long life.

For further information address American Engineer, reference No. 542.

ELECTROSTATIC PRECIPITATORS

Precipitators which will remove either solid or liquid particles from plant discharge gases are made available to American industry.

The manufacturer states that the equipment will remove boiler fly ash, tar, acid mists, soda ash, fluorides, catalysts, dust, and other nuisances or valuable byproducts.

The precipitators are designed for maximum removal or recovery of solid or liquid particles from industrial and waste gases, and are engineered specifically to the needs of individual plants to provide any desired efficiency.

Precipitators are especially interesting to industries located in municipalities which have new smoke control ordinances, or where there is a trend toward tightening smoke abatement regulations. The equipment lends itself to many unusual applications.

For further information address American Engineer, reference No. 543.